

Lecture 3

PC Software Requirements

Text: Chapter 2

The Operating System

The purpose of an operating system is to facilitate access to the resources of the computer, such as

The CPU (Program Loading)
Memory (Managing Segments)
The File System
Input Devices
Output Devices
Interrupt Handling

Getting the operating system started is called the “BOOT” process.

DOS (Disk Operating System) consists of three main files:

IO.SYS (or **IBMBIO.COM**)

Initialization functions at boot time and supplements the I/O functions of the BIOS.

MSDOS.SYS (or **IBMDOS.COM**)

The main operating system. It does file management, memory management and I/O.

COMMAND.COM

Command processor (or “shell”) that interprets what you type.

The Boot Process

Power on (“Cold boot”)

- All memory locations cleared to zero.

- Parity check done on memory.

- CS register set to X'FFFF'

- IP register set to X'0000'

CS:IP begins execution of BIOS

- Check ports

- Initialize devices

- Initializes memory tables

If system disk present, access bootstrap loader which

- Loads IO.SYS from disk

- Loads MSDOS.SYS from disk

- Transfers control to IO.SYS

IO.SYS sets itself up and transfers control to MSDOS.SYS

- Reads and executes CONFIG.SYS

- Passes control to COMMAND.COM

COMMAND.COM

- Executes AUTOEXEC.BAT

- Displays prompt

- Waits for keyboard input.

Two Kinds of Program Files

.COM files

.EXE files

Both are executable programs.

.COM Files

One segment containing code, data and the stack.
Good for small programs.

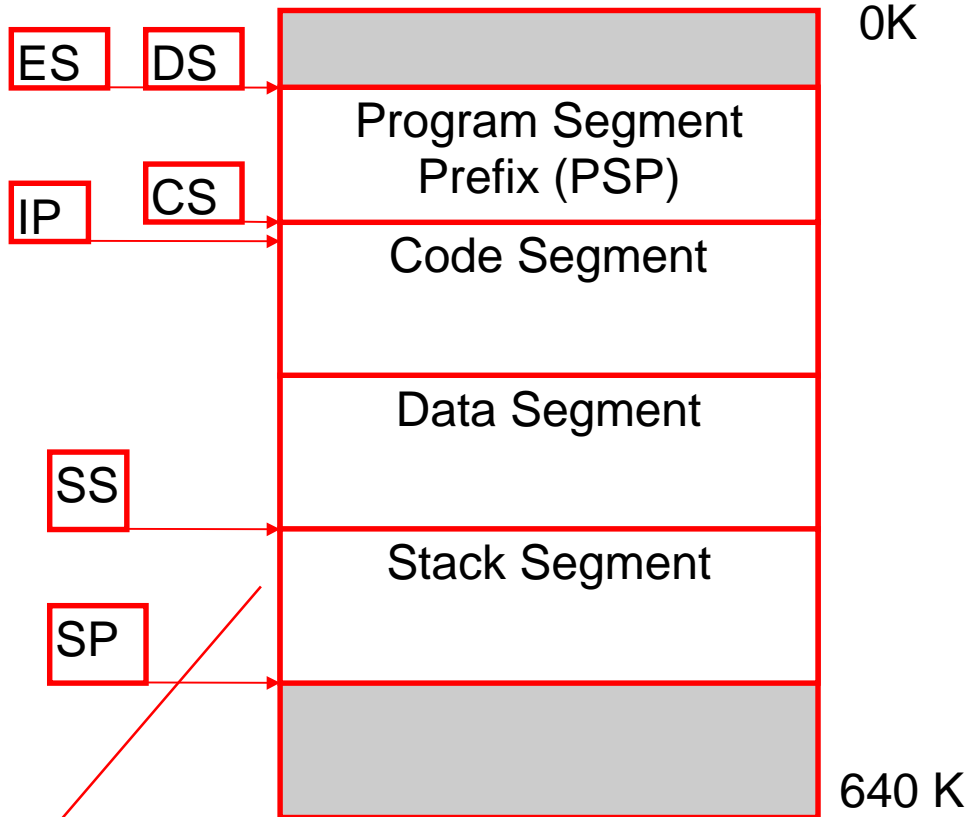
.EXE Files

Separate (and perhaps multiple) Code, Data and Stack segments.

Used for large programs and where separate segments are desired (most programming).

The Loading of an EXE file:

1. Access the .EXE file from disk.
2. Construct 256-byte (100H) PSP (Program Segment Prefix) on a paragraph boundary.
3. Store program in memory directly after the PSP
4. Load Address of PSP in the DS and ES registers.
5. Load Address of code segment in the CS, set the IP to the address of the first instruction (usually zero).
6. Load address of stack in the SS, set SP to the size of the stack.
7. Transfer control to the program.



Notice that the SP decreases as the stack grows.

The Stack

A space provided for temporary storage of addresses and data items.

Both .COM and .EXE programs require a stack.

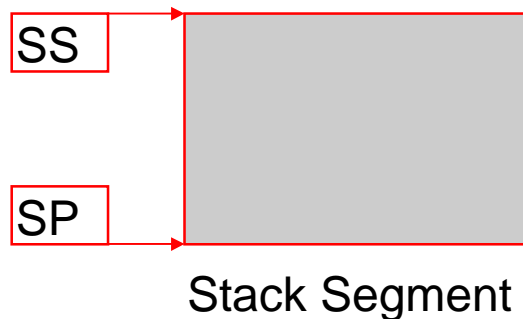
Automatically defined by DOS for .COM

Must be defined by programmer for .EXE

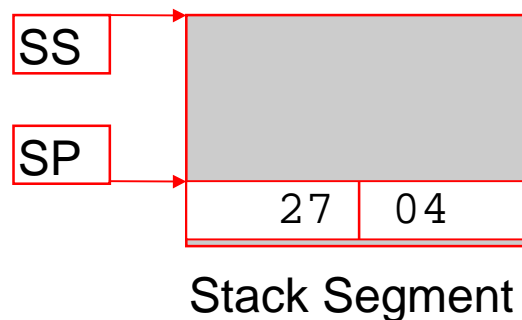
Adding to the stack is called **PUSH**

Removing from the stack is called **POP**

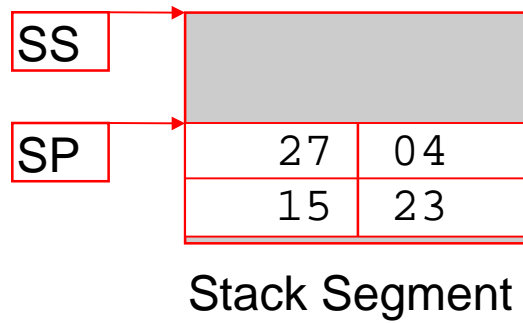
Example:



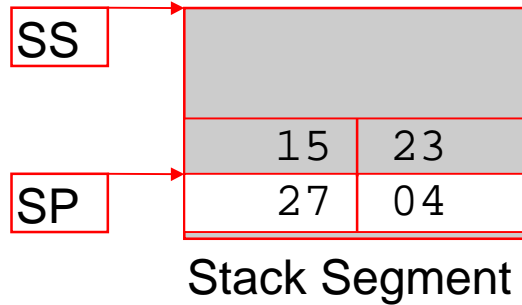
Suppose the AX register contains 0427H, and we PUSH AX:



Suppose BX is 2315H, and we PUSH BX:



Now POP AX: AX becomes 2315h



Now POP BX: BX becomes 0427h

